Welcome

Restoration Advisory Board Meeting

Robins Air Force Base

January 9, 2003

Restoration Advisory Board Meeting Robins Air Force Base

January 9, 2003

Theme: Robins AFB Remediation Program Progress

Welcome and Program Introduction

Mr. Jim Harden

Community Co-Chair

Sonic Booms: The Sound of Freedom

Mr. John Birdsong
Chief of Security, Plans and Programs

January 9, 2003

Optimizing Remediation System Performance RAB Training

Mr. Greg Roush, GeoSyntec

January 9, 2003

Overview

- Background – Remedy Selection
- Step 1: Remediation System Design / Installation
- Step 2: Performance Monitoring
- Step 3: Performance Optimizing
- Step 4: Remediation Conclusion
- Summary

Background - Remedy Selection

- Occurs after investigation phase and the extent of contamination is defined
- Involves Base and regulatory agencies
- Remedy selected to meet remedial goals
- Considers preferred remedies
- Considers innovative technologies

Background - Remedy Selection

- The remedy is defined in a Corrective Action Plan (CAP); key elements are:
  - Discussion of the contaminant plume
  - Description and conceptual design of the remediation system
  - Performance Monitoring Plan
  - Regulatory clean-up criteria
  - Reporting schedule
- Approval by regulatory agencies
- Modification of Robins AFB Hazardous Waste Facility Permit

Background - Remedy Selection

- CAP completion criteria can include both:
  - Concentration based criteria
    - Reduce concentrations to a defined value
  - Performance based criteria
    - Remove 80 percent of the contaminant mass
    - Reduce free product to a defined value by a specific date

Background - Remedy Selection

Typical remediation systems, and their use:

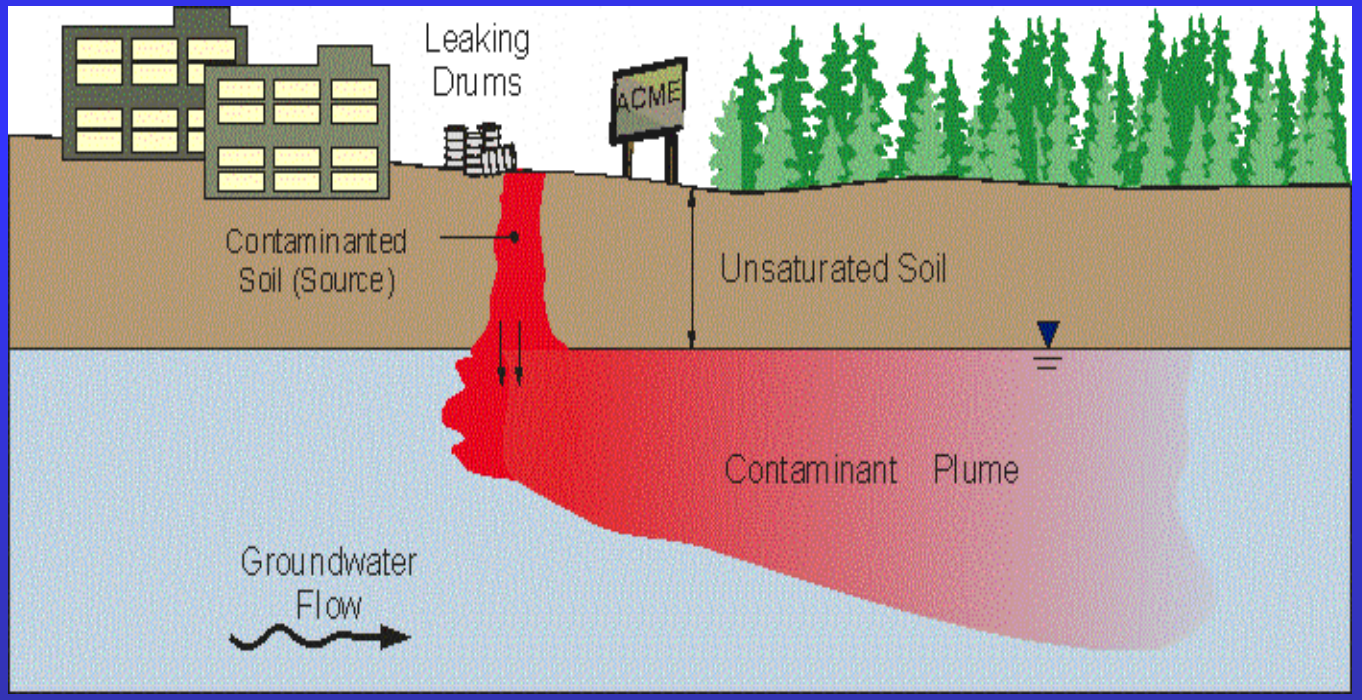
Groundwater Recovery Wells	Clean up contaminants
Soil Vapor Extraction	Clean up contaminants
Air Sparging	Clean up contaminants in groundwater
Bioventing	Clean up biodegradable

Background - Remedy Selection

- To develop the CAP:
  - Computer models are used to:
    - assess the movement of contaminants in groundwater
    - develop design factors (i.e. capture zone, flow rate, well spacing)
  - Field tests are performed to evaluate technologies or to refine design factors

Background - Remedy Selection

Example site: solvent release to soil and groundwater

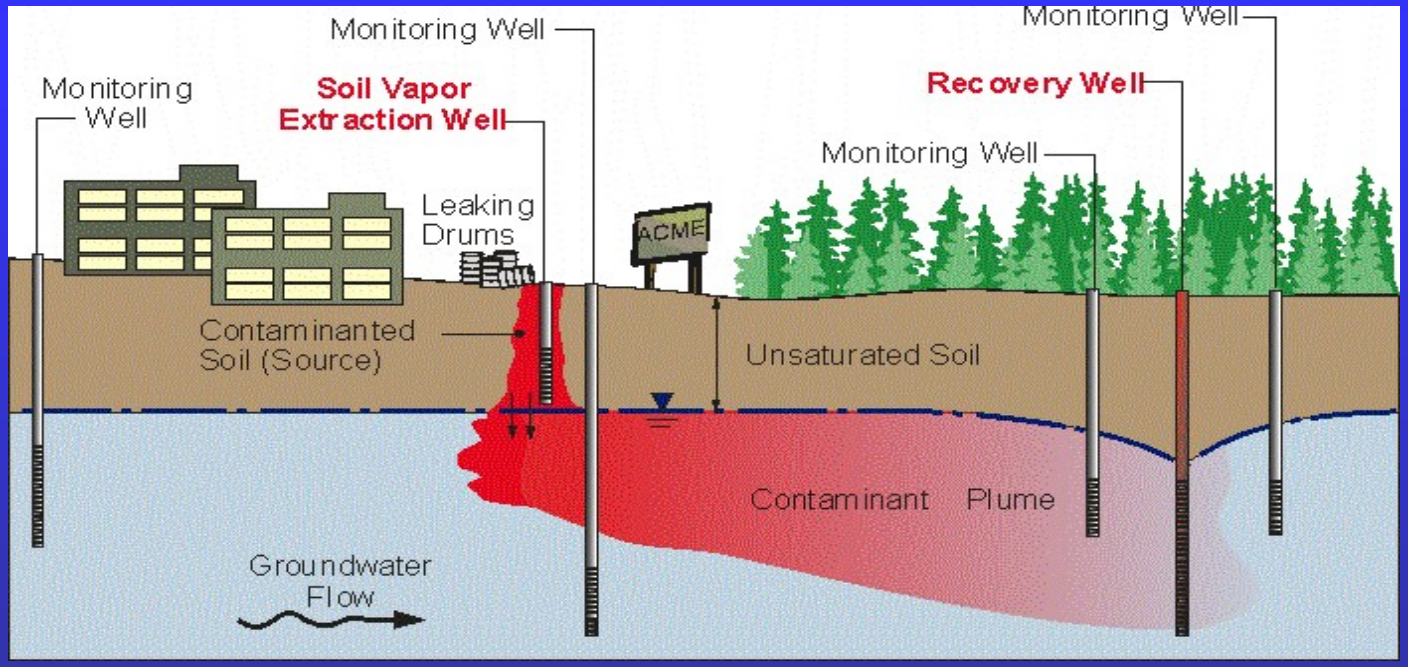


Background - Remedy Selection

- Using this example site, the remediation technologies would be:
  - Soil vapor extraction wells to:
    - remove the solvents from the soil
  - Recovery wells to:
    - Contain groundwater movement… stop the groundwater plume from getting bigger
    - Remove contaminants from the saturated soils and groundwater
    - Multiple wells may be used

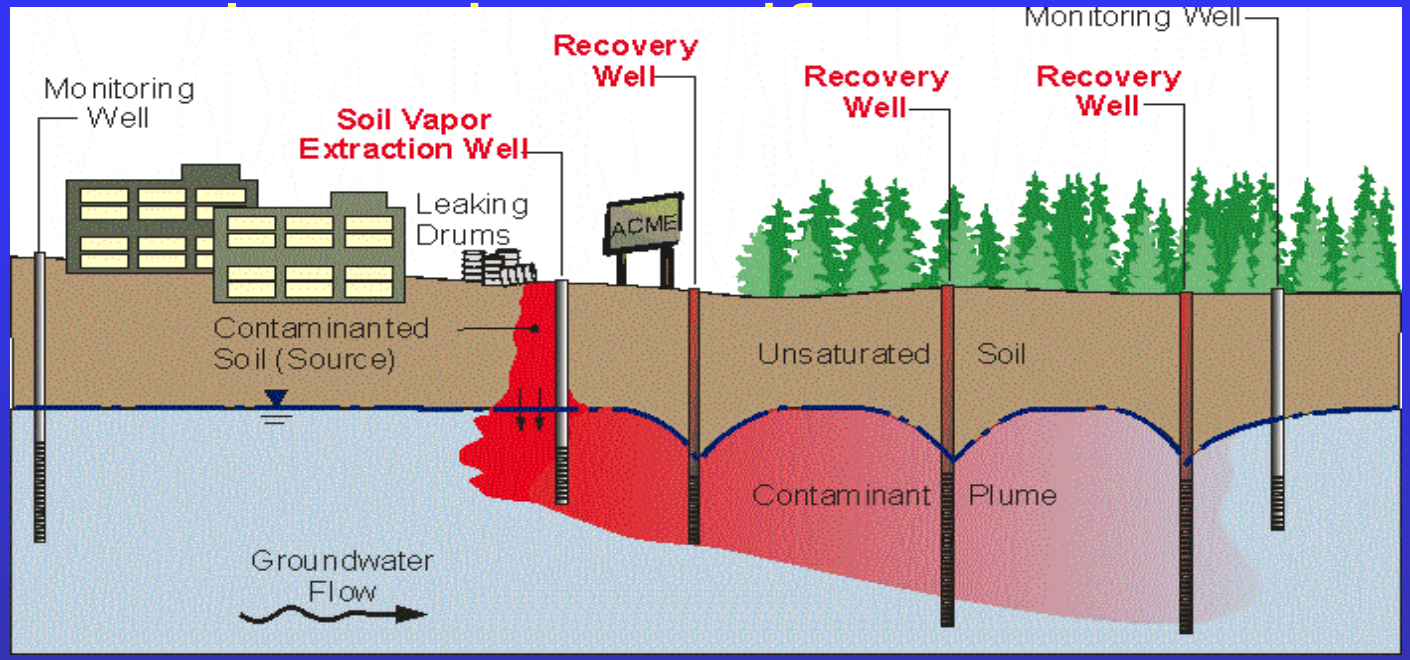
Background - Remedy Selection

Example site: recovery well to clean groundwater and soil vapor extraction well to clean soil



Background - Remedy Selection

Example site: multiple recovery wells used to

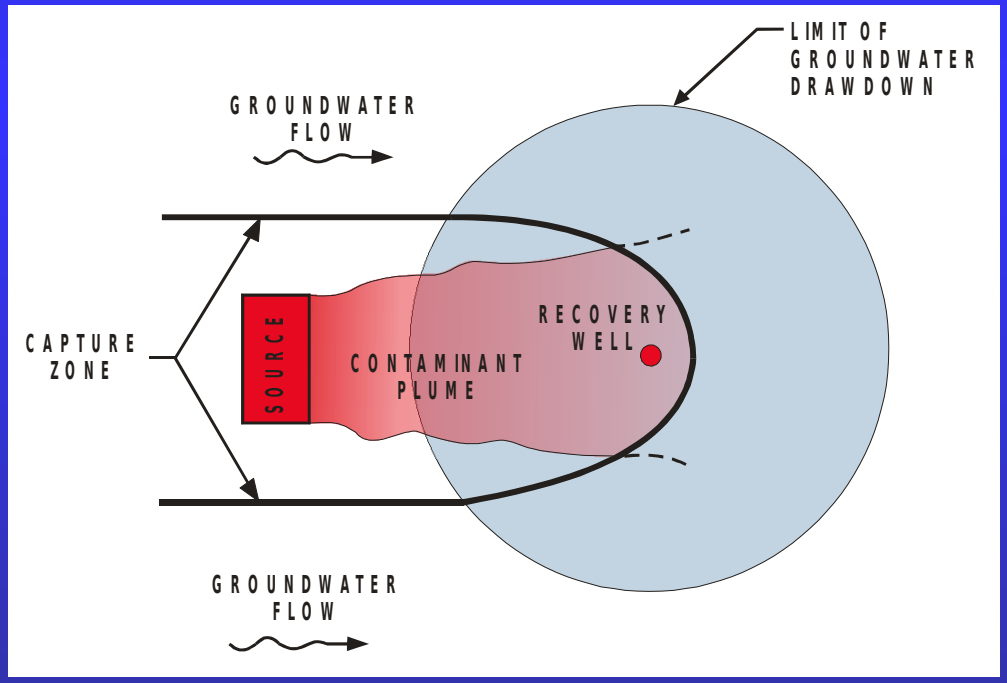


Step 1: Remediation System Design / Installation

- The CAP includes a conceptual design
- A detailed engineering design is needed for construction
- Remediation system is installed
- Final construction report and drawings are prepared, including operation and maintenance manual

Step 1: Remediation System Design / Installation

Recovery well area of influence vital to design



Step 2: Performance Monitoring

- The CAP defines the Performance Monitoring Plan. Using recovery wells as an example, points to consider are:
  - Does the groundwater flow towards the recovery well?
  - Is the amount of the constituents in the recovered groundwater increasing, decreasing, or staying the same?
  - Is the plume getting smaller?
  - Is the treatment system working?

Step 2: Performance Monitoring

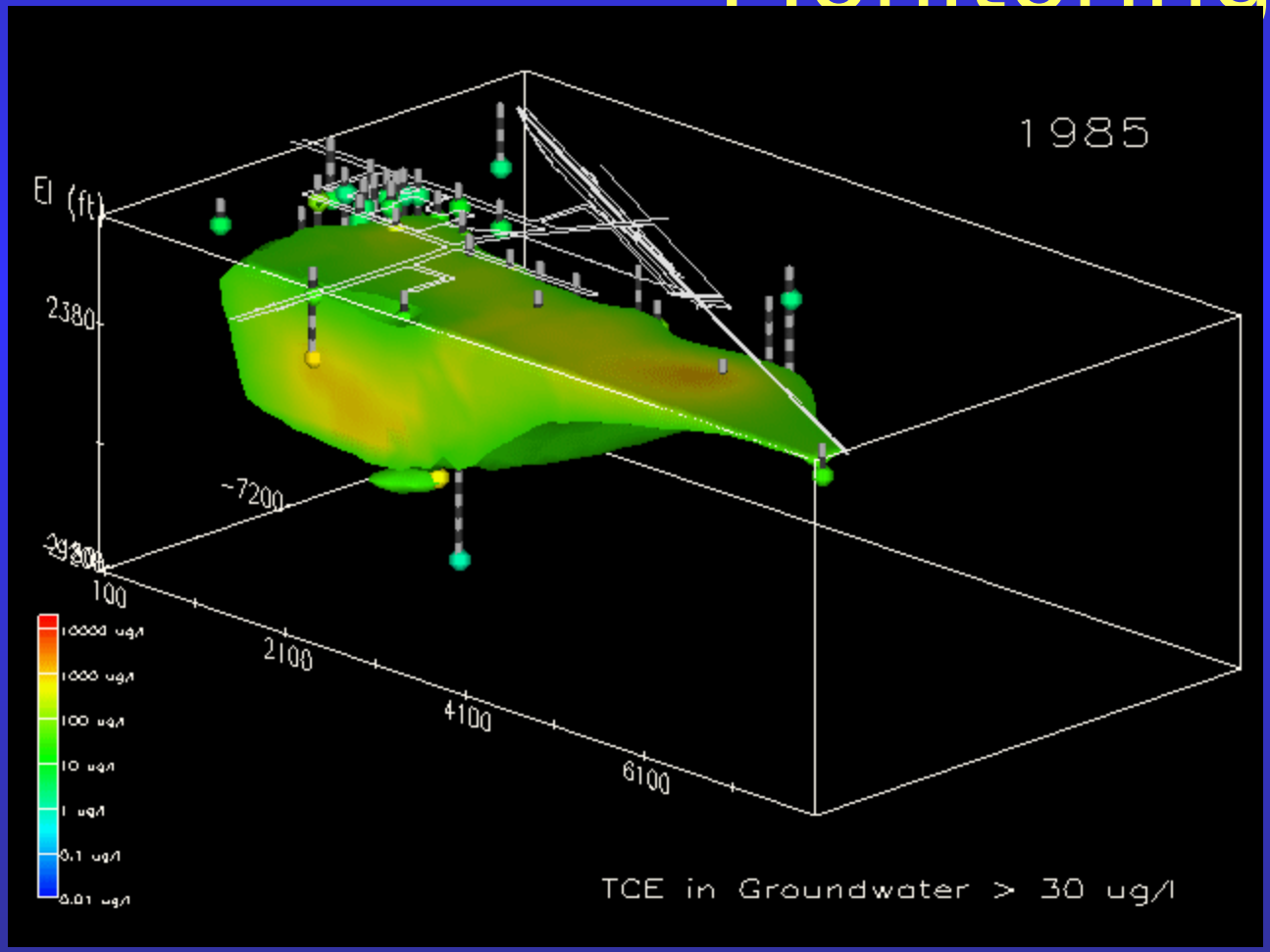
- How the evaluation is accomplished:
  - Measure groundwater levels as required
  - Evaluate groundwater plume routinely
  - Determine amount of contaminants removed
  - Present data and recommendations in the Corrective Action Progress Reports; submitted to the regulatory agencies

Step 2: Performance Monitoring

- Checking the recovery well flow rate

Step 2: Performance Monitoring

Example: plume restoration monitoring

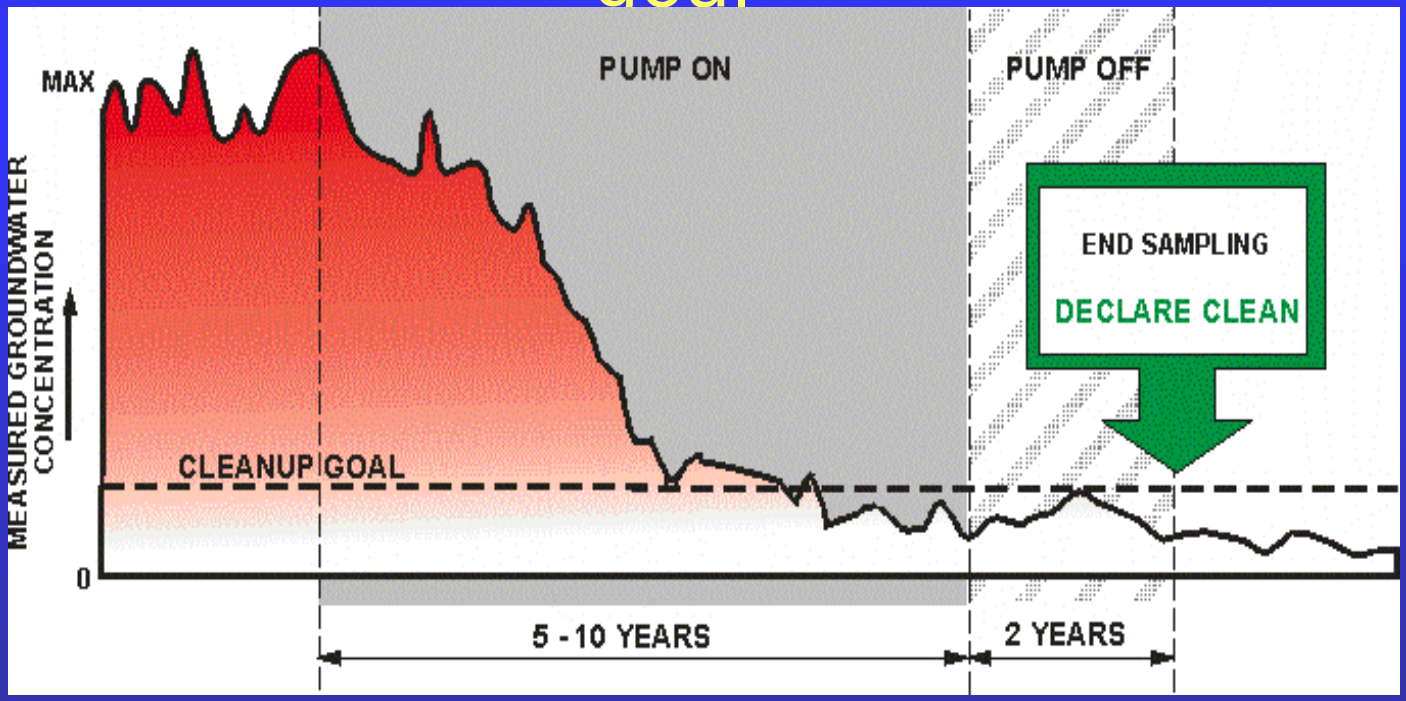


Step 2: Performance Monitoring

- When the contaminant concentrations reach the clean-up goal
  - The corrective action system is turned off
  - Groundwater is monitored as required to ensure the clean-up goal is maintained
  - Reports are submitted to the regulatory agencies
  - If the contaminant concentrations do not increase above the clean-up goal then No Further Action is requested

Step 2: Performance Monitoring

Example: groundwater concentrations reach the clean-up goal



Step 3: Performance Optimizing

- Corrective Action Progress Report recommendations:
  - Ensure the system complies with the CAP goals
  - Are used to improve or optimize the system performance
  - Objective is to balance cost effectiveness with environmental stewardship

Step 3: Performance Optimizing

- Common recommendations are:
  - Operational
    - Replace low producing pumps
    - Change the flow rates
    - Change the sampling frequency
    - Change the sampling contaminant list
    - Scale systems down
  - Clean-up approach
    - natural attenuation

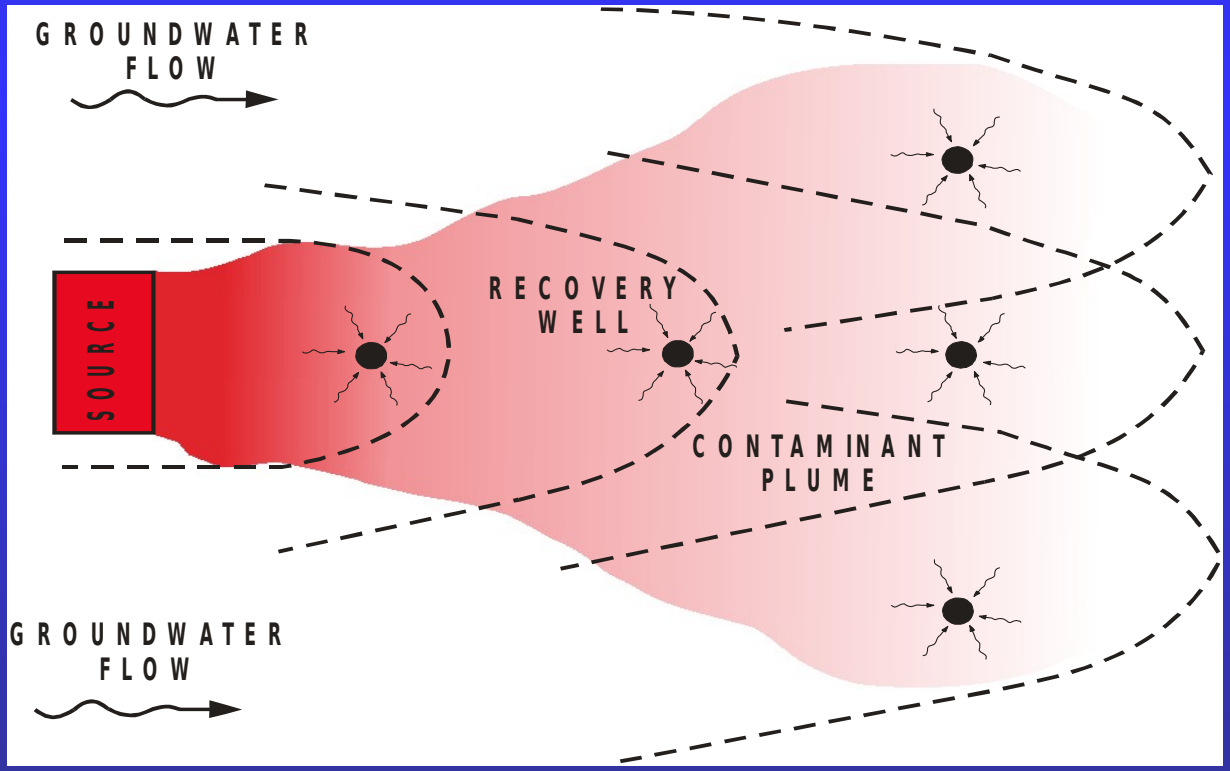
Step 3: Performance Optimizing

- Change the sampling contaminant list; an example:
  - A plume has two contaminants: VOCs and metals. After remediation, the metal clean-up goal is met but VOCs remain above the goal. Recommend to only sample for VOCs.

- Scale the system down; an example:
  - Five wells are installed to remediate a plume. After remediation the plume shrinks and three wells are drawing in clean water. Recommend to only pump from two wells.

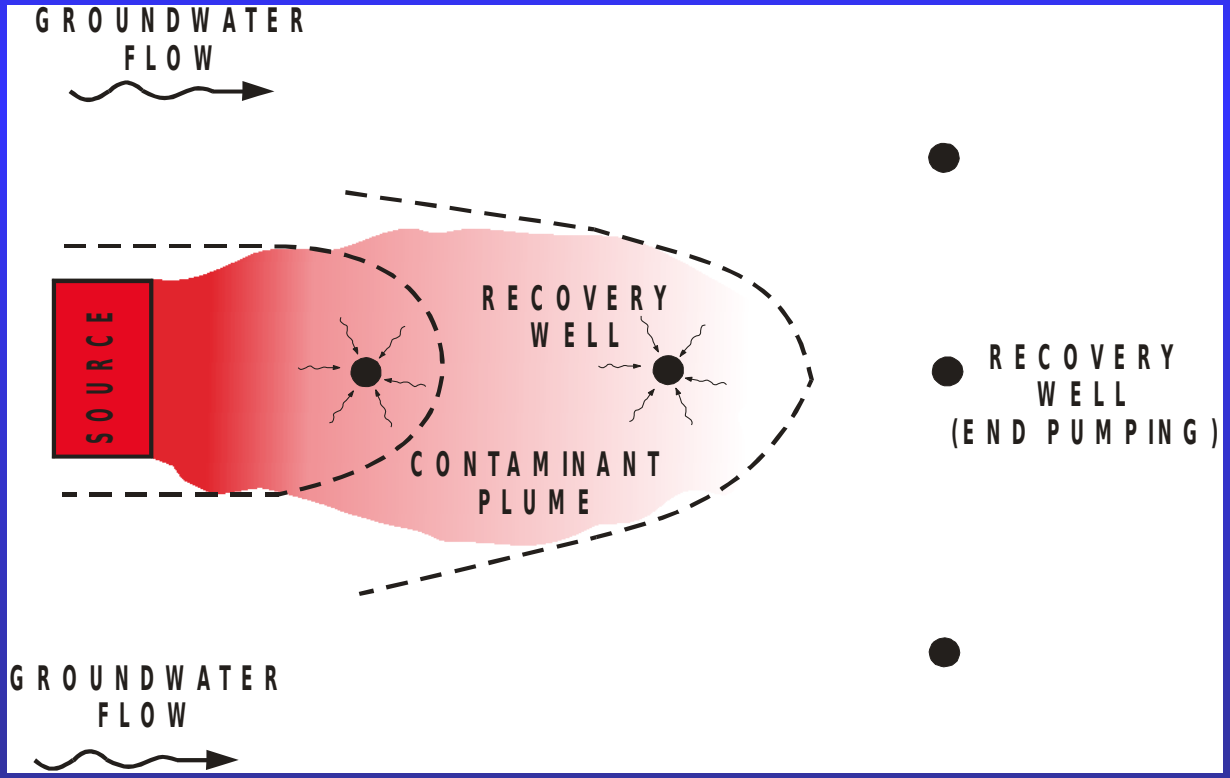
Step 3: Performance Optimizing

System scale down example: Initial groundwater plume and recovery well layout



Step 3: Performance Optimizing

System scale down example: plume after five years of operation

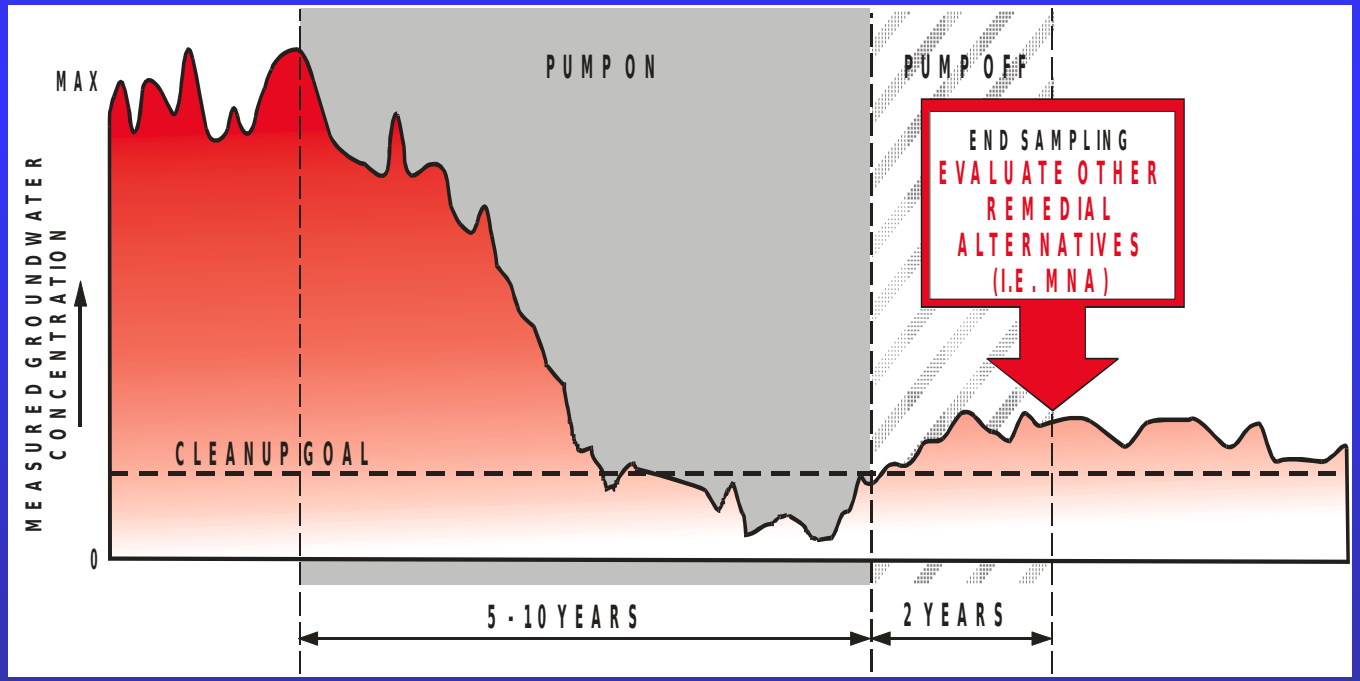


Step 3: Performance Optimizing

- Natural attenuation; an example:
  - Uses natural processes that reduce contaminant concentrations to acceptable regulatory levels
  - Can effectively reduce remaining contamination

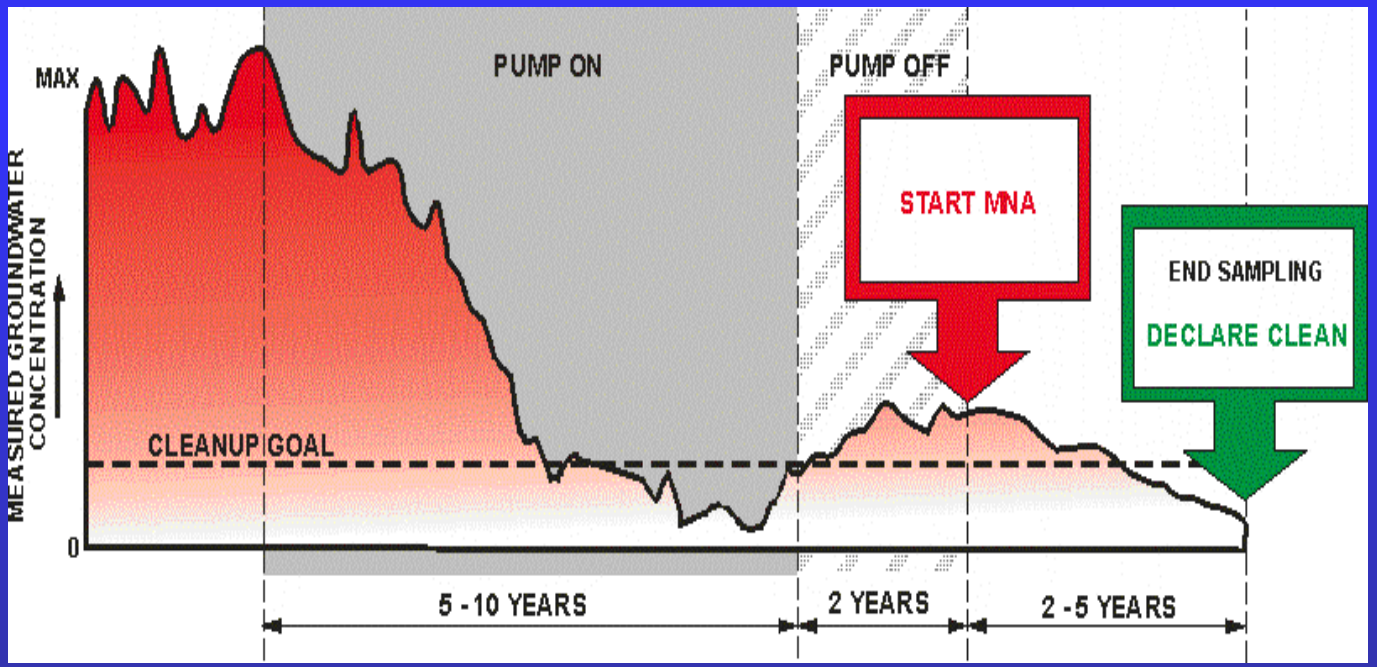
Step 3: Performance Optimizing

Example: residual contamination exceeds clean-up goal



Step 3: Performance Optimizing

Natural attenuation is used to remove residual contamination



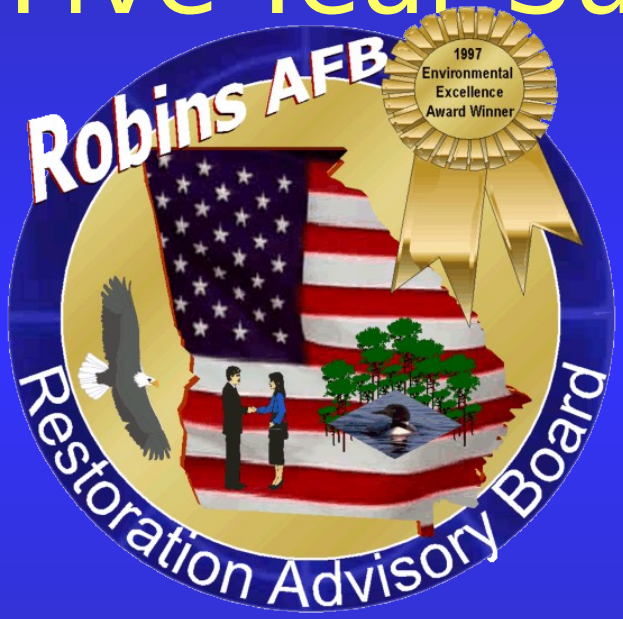
Step 4: Remediation Conclusion

- What is required to complete corrective action ?
  - Contaminant concentrations in the aquifer are reduced to clean-up goals specified in the CAP
  - Post corrective action monitoring confirms the clean-up goals are met
  - Regulator approval
  - Permit modification
  - Decommissioning wells and equipment

Summary

- Corrective Action systems are designed after the site investigation is done
- Regulatory approval of the CAP is obtained
- Corrective action performance data is reviewed to assess when the clean-up goals are achieved
- The systems can be optimized to reach clean-up goals, balancing environmental stewardship and good monetary judgement
- Alternative approaches may be used to address residual contamination cost effectively
- When the clean-up goals are reached, no further action is required
- Regulator approval is required to conclude corrective action

Progress of Robins Cleanup Efforts: A Five-Year Summary

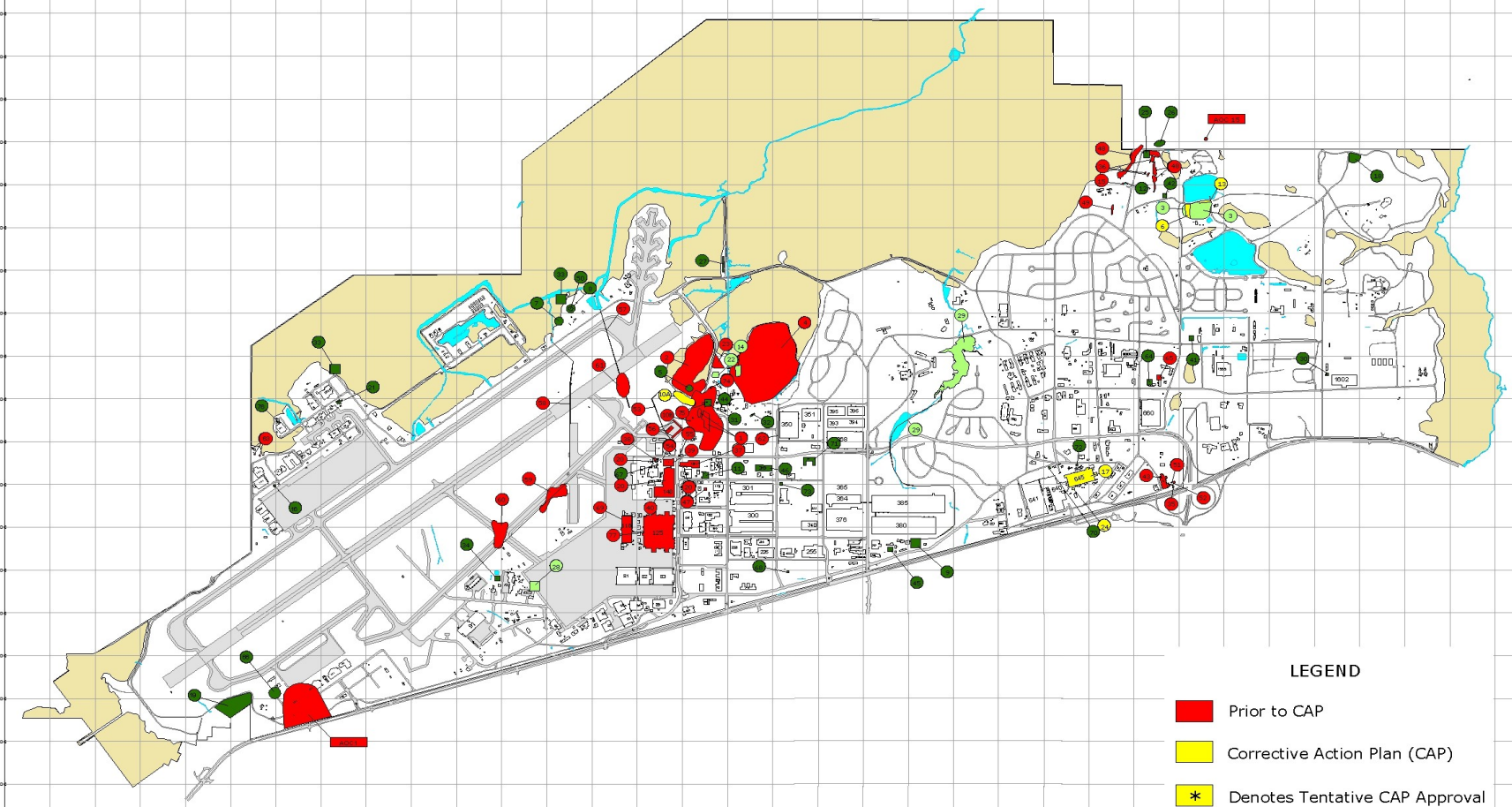


Mr. Kevin Long
Chief, Restoration and Resources Division

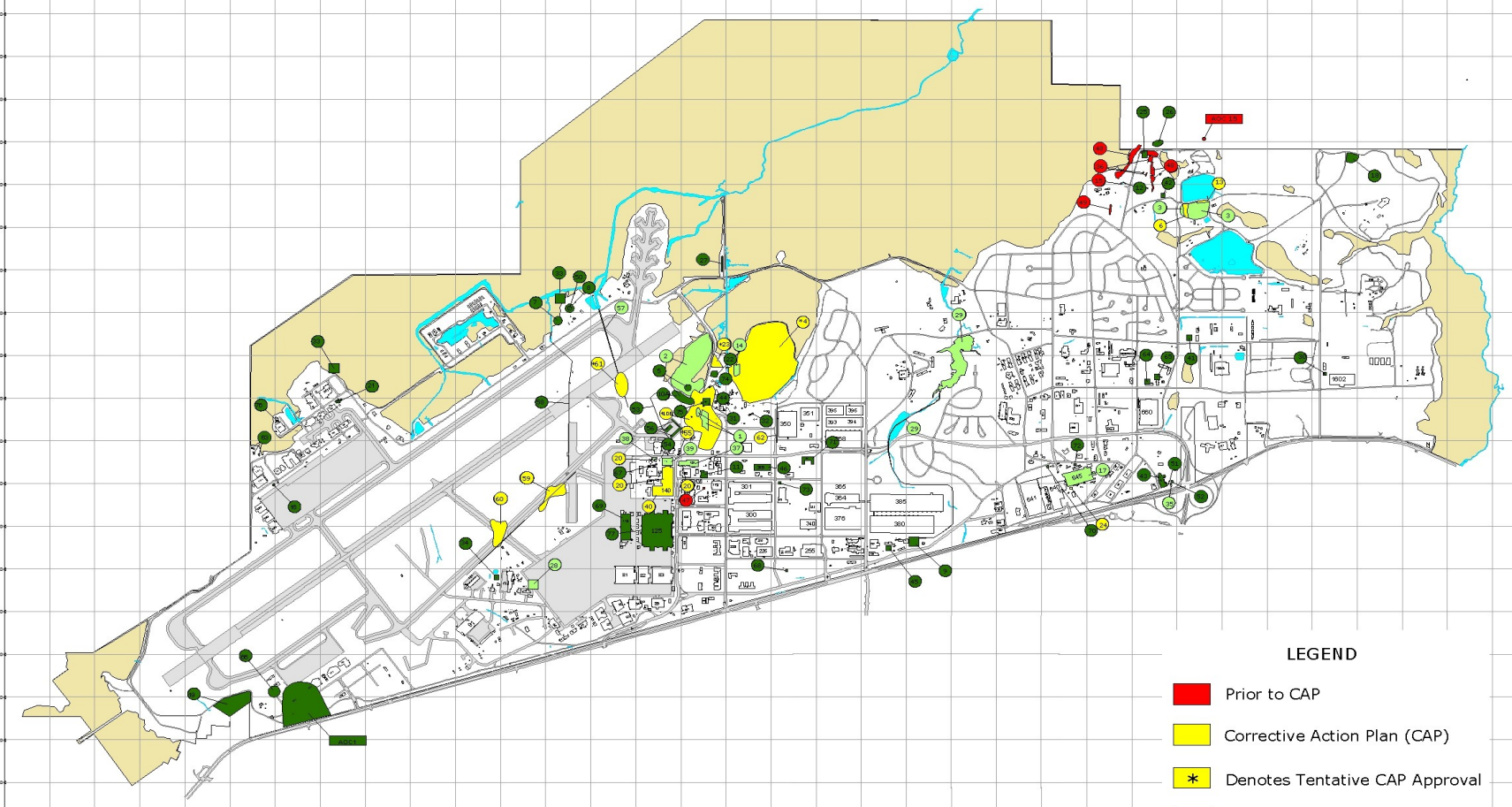
January 9, 2003

RESTORATION SITE STATUS MAP 1997

RESTORATION SITE STATUS MAP 2000



RESTORATION SITE STATUS MAP 2002



LEGEND

- Prior to CAP
- Corrective Action Plan (CAP)
- * Denotes Tentative CAP Approval
- Remediation in Place
- No Further Action (NFA)

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New Business and Program Closing

Mr. Jim Harden

Community Co-Chair

Next RAB Meeting

March 13, 2003

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Thank you!